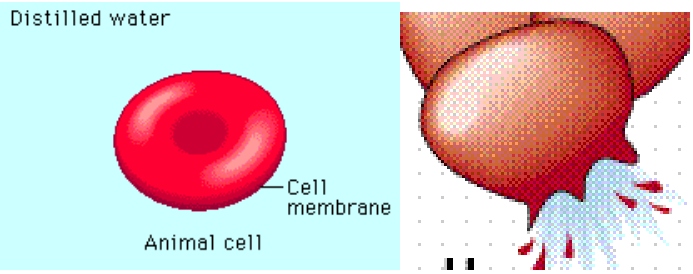
Water Potential

Water potential is the tendency of water to move one place in favor of another. Consider the following:

A red blood cell placed into pure water will burst open, why?



Water from the outside entered the blood cell continuosly, leading to it's bursting.

Why did the water keep moving in? Why didn't water leave the cell instead?

Water potential (Ψ) = pressure potential (Ψ_P) + solute potential (Ψ_s)

Water potential is determined by 2 things:

1. The solute potential – The ability of a solute to attract water molecules

$\Psi_s = -iCRT$

i = ionization constant (ability to break apart into ions…thereby occupying water)

(sucrose = 0 since it does not ionize in water)

(NaCl = 1 since it ionizes 100% in water)

C = molar concentration of solution (expressed as ___ **M**)

R = pressure constant (0.0831)

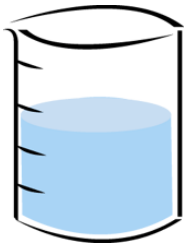
T = Temperature in KELVIN (273 + celcius temperature)

2. The pressure potential Ψ_P

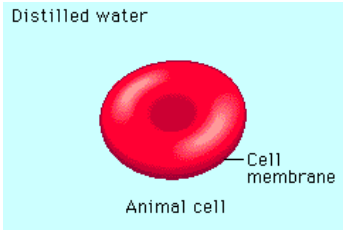
Pressure potential in an *animal cell* or an *open container* is 0 because nothing will exert pressure back as water moves in.

Other cells have **cell walls** that will **increase** pressure as water moves into their cells.

Pure water



0.2M red blood cell (assume i = 1, 20°C)



1. Calculate the water potential, solute potential and pressure potential for each. (round to nearest whole number).

2. Water always moves from areas of higher water potential to areas of lower water potential. Use this rule and your calculations to explain why the red blood cell bursts open when placed in pure water.

3. A potato (assume 0.2M sucrose) is placed into a 0.8M sucrose solution at 20^{o}C. Predict what would happen to the potato and **justify** your predictions using you calculations.